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United States Department of the Interior
NATIONAL PARK SERVICE

Montezuma Castle and Tuzigoot National Monuments

Post Office Box 219

527 S. Main Street

Camp Verde, Arizona 86322

IN REPLY TO:
N3041

September 16, 2011

Ernest G. Johnson
Executive Director
Arizona Corporation Commission
1200 W. Washington Street
Phoenix AZ 85007Arizona Corporation Commission
DOCKETED

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RECEIVED

Dear Mr. Johnson,

It has come to our attention that Montezuma Rimrock Water Company (MRWC) is asking the Arizona Corporation Commission (ACC) for an emergency rate increase in order to acquire an institution loan to privately fund the arsenic treatment facility. In February 2010, I was contacted by MRWC owner Patsy Olsen about her need to complete an Environmental Information Document (EID). Subsequently, I talked to Sara Konrad, Environmental Program Supervisor, Water Infrastructure and Finance Authority (WIFA), who informed me that Ms. Olsen was required to prepare an EID.

WIFA uses the EID to initiate the National Environmental Policy Act to identify the proposed project's environmental consequences and measures that will be taken to reduce negative impacts. The EID requirements are intended to document the environmental effects of proposed drinking water and wastewater infrastructure projects. When the EID is in compliance with WIFA's regulations, the agency will adopt it as the project's Environmental Assessment to support the request for funding and determine a finding only when the document indicates that there will be no significant impacts on the environment. If there is doubt, WIFA will require an Environmental Impact Statement (EIS).

On November 8, 2010, the National Park Service provided comments to WIFA on MRWC's environmental information document about the arsenic facility installation (see attachment). WIFA had the EID reviewed by an independent engineering firm and the Environmental Protection Agency. Both recommended that an EIS be done. WIFA agreed with the findings and required an EIS for funding the grant. As a consequence, MRWC chose another means to seek funds for the project.

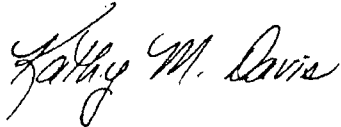
The position of the National Park Service is that the project requires an EIS to properly identify and analyze the environmental effects of the proposed well, and detail mitigation measures if needed. As stated in our November 2010 letter to WIFA, we believe that people need safe

potable water. Our concerns for the project are with the cumulative effects of the new well. The MRWC's EID did not use accurate numbers to show the current situation on the regional groundwater. Data we obtained from US Geological Survey and our domestic well showed twice the annual decline, i.e., 5.0 feet compared to 2.55 feet in the EID document. The location of MRWC Well #4 is close to Wet Beaver Creek and would affect local groundwater and surface creek flows.

Furthermore, with that level of decline in groundwater levels, we are anticipating that the commercial wells would also need to be drilled deeper to access groundwater than was analyzed. If the well was drilled deeper into the lower unit of the regional aquifer with rock units of the Paeozoic section, we anticipate that this could affect the unique water feature in Montezuma Well (unit of Montezuma Castle National Monument).

We request that the Arizona Corporation Commission hold an evidentiary hearing on MRWC's emergency rate increase request. For the protection of the environment and a comprehensive understanding of cumulative effects, we urge that Montezuma Rimrock Water Company be required to complete an Environmental Impact Statement as a condition of funding the project.

Sincerely,



Kathy M Davis
Superintendent

Copies of the foregoing documents mailed and
emailed this ____ day of September, 2011, to:

Steven M. Olea, Director
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United States Department of the Interior

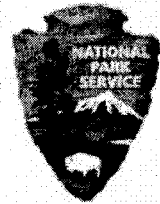
NATIONAL PARK SERVICE

Montezuma Castle and Tuzigoot National Monuments

527 S. Main St.

PO Box 219

Camp Verde, AZ 86322



IN REPLY REFER TO:
N3041

Sara Konrad
Environmental Program Supervisor
1110 West Washington, Suite 290
Phoenix, Arizona 85007

November 8, 2010

Dear Ms. Konrad,

Thank you for the opportunity to comment on the "Environmental Information Document Arsenic Facility Installation, Montezuma Rimrock Water Company, LLC."

We have enclosed our comments, which are from four different people: two from national monument staff, one from our Washington Office Water Resources Division, and one from a private groundwater hydrologist consultant that we contracted to review the document.

The National Park Service believes that people need safe potable water. We do have concerns about the project in particular with the cumulative effects of the new well: the numbers that were used as the regional groundwater annual decline of 2.55 feet in the document do not match our own numbers which show a regional groundwater annual decline of 5.0 feet (nearly twice their number). Because of this difference, we do not think that the analyses done by the document accurately relates the impacts to groundwater declines in the region.

Furthermore, with that level of decline in ground water levels, we are anticipating that the commercial wells would also need to be drilled deeper to access groundwater than was analyzed. If the wells drilled deeper into the lower unit of the regional aquifer with rock units of the Paleozoic section, we anticipate that this could directly affect Montezuma Well proper.

If you have any questions, please do not hesitate to contact me (928-567-5276 x 223) or Sharon Kim, Chief of Natural Resources (928-649-6195x 226).

Sincerely,

Kathy Davis
Superintendent

Enclosures

Paul Christensen, Hydrologist
 NPS—Washington Office Water Resources Division
 Comments for EID

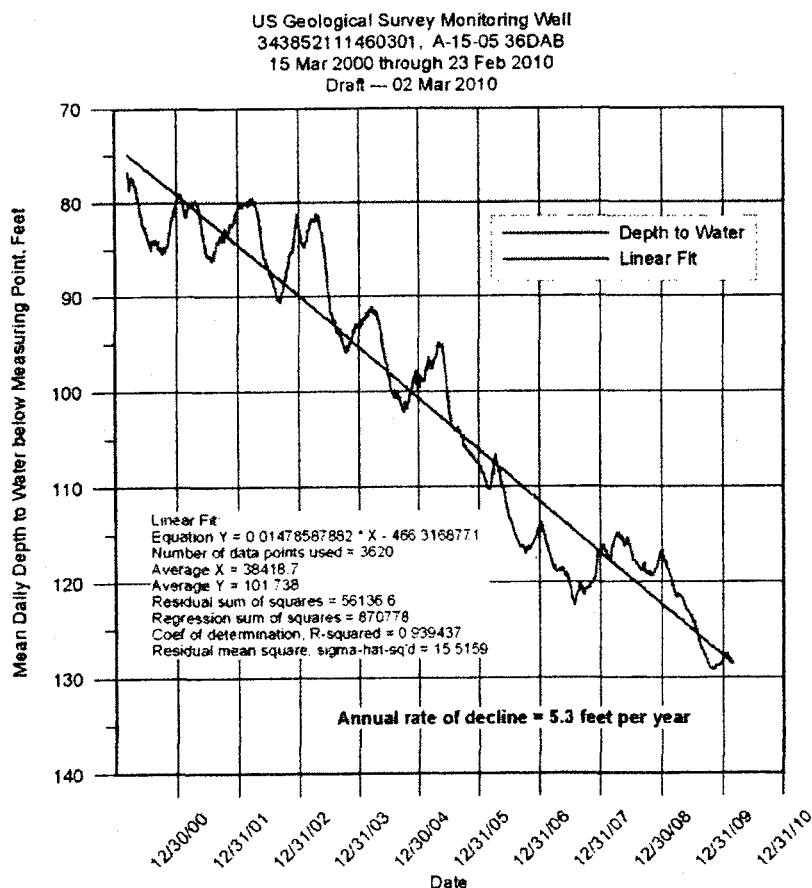
2.1 REGIONAL AQUIFER

p. 7, bottom of 1st paragraph. The USGS has prepared an abstract regarding the occurrence of arsenic in groundwater in the AFI project area. This abstract may be useful in preparing the report's discussion of arsenic. Here is the URL.

http://gsa.confex.com/gsa/2009AM/finalprogram/abstract_161469.htm

2.2 REGIONAL DECLINE IN GROUND-WATER LEVELS

pp. 7-8. The groundwater levels of the upper unit of the regional aquifer is declining about 5.3 feet per year in the area of the AFI project. See graph below.



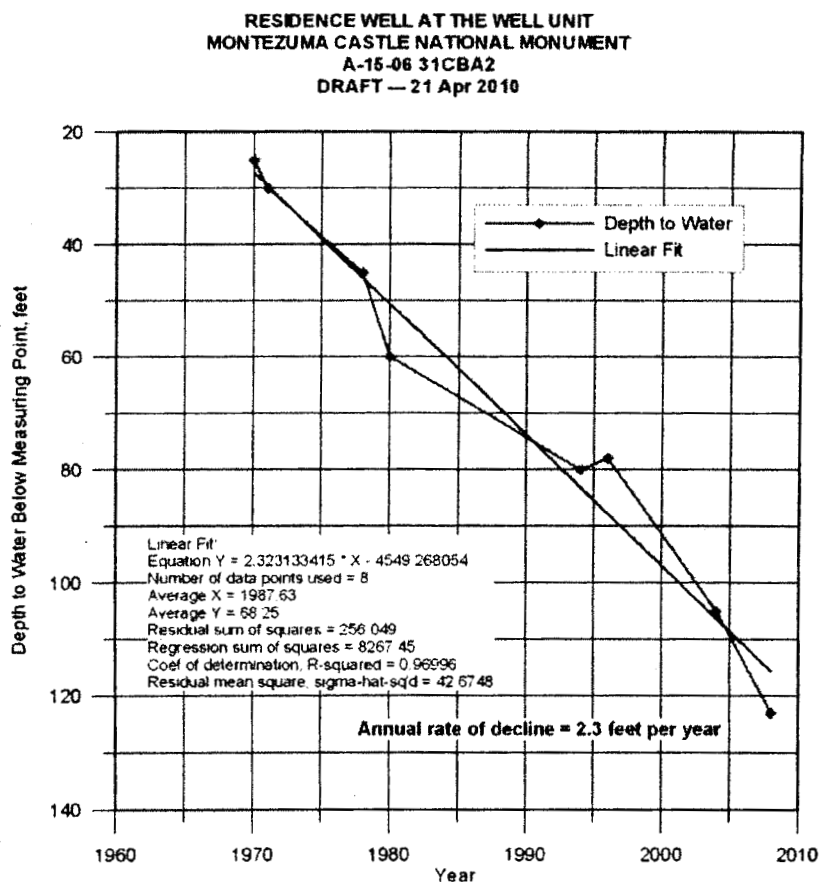
Paul Christensen, Hydrologist
NPS Washington Office Water Resources Division

Water levels from this US Geological Survey monitoring well were not included in Figure 4 of the report. This well is located about 1,250 feet northeast of MRWC Well No. 4, about 850 feet southeast of MRWC Well No. 1, and about 2,400 feet south-southeast of MRWC wells No. 2 and No 3.

Paul Christensen, Hydrologist
NPS Washington Office Water Resources Division

pp. 8-9. 2.3 MONTEZUMA WELL NATIONAL MONUMENT AND BEAVER CREEK

P. 8, 1st paragraph. At the Residence Well within the Well unit of Montezuma Castle National Monument, water levels have been declining about 2.3 feet per year. See graph below.



The Residence Well is located about 2,800 feet east-northeast of Well No. 4. This well provides water to the Well Unit.

P. 8, 2nd paragraph. Change “in the regional aquifer” to read “in the upper part of the regional aquifer.”

P. 8, 3rd paragraph, 3rd sentence. Citation does not appear correct.

P. 8, 3rd paragraph, last sentence. Change “in the regional aquifer” to read “in the upper part of the regional aquifer.” Complete the citation and add source to references.

Paul Christensen, Hydrologist
NPS Washington Office Water Resources Division

Recommend adding a paragraph that describes the source of water to Montezuma Well. Sources of information:

http://gsa.confex.com/gsa/2009AM/finalprogram/abstract_161469.htm . Noted above.

<http://ngwa.confex.com/ngwa/2008gws/techprogram/P4872.HTM> .

Groundwater flow, geology and geochemistry of Montezuma Well, a natural spring at Montezuma Castle National Monument, Central Arizona

Raymond H. Johnson, U.S. Geological Survey, Denver

Wednesday, May 12, 12:10 PM

University of Arizona,

College of Agriculture and Life Sciences

School of Natural Resources and Environment, Room 353

Abstract

The U.S. Geological Survey is assisting the National Park Service with a geologic and geochemical study to better understand the source(s) of groundwater to Montezuma Well (a natural spring) in Montezuma Castle National Monument, central Arizona. The first objective of this research is to identify travel paths for groundwater supplying Montezuma Well and the surrounding region on the basis of chemical and isotopic analyses of groundwater samples and rock samples. Isotopic and chemical data are being used as naturally-occurring tracers of recharge source areas and water-rock interactions. The second objective is to develop a conceptual hydrogeologic framework model that identifies the principal stratigraphic and structural features that serve as constraints or conduits for groundwater movement for the region surrounding Montezuma Well. This framework will integrate available geologic, geophysical, hydrological, and geochemical data. The results of this study indicate how a unique combination of geology and geochemistry has created Montezuma Well, and the added understanding of the groundwater flow system will assist the National Park Service in protecting this important natural feature in the future.

The majority of groundwater recharge occurs in the topographically high area of the Mogollon Rim with elevations greater than 7,000 feet (determined using oxygen and deuterium isotopes); whereas, the elevation of the water surface at Montezuma Well is 3,560 feet. Recharge through the Mogollon Rim follows fractures in the cover basalt and the underlying Permian sandstones and then flows rapidly through the karstic Redwall Limestone at depth (determined using strontium isotopes, tritium, and C-14 data). Geologic inferences from a magnetic map of the area indicate the presence of a basalt dike underneath Montezuma Well that affects groundwater flow and geochemistry. This basalt dike appears to be a barrier for regional groundwater flow and a locus for a component of deep-seated groundwater flowing upward along bedrock fractures. This forces the groundwater flowing at depth (< 750 feet) to the surface, resulting in groundwater discharge at Montezuma Well (conceptualized with simple groundwater flow modeling). This fracture system appears to contribute a small amount of brine related to volcanic degassing (confirmed using helium isotopes). This brine contains carbon dioxide, salts, and trace elements such as arsenic, which mixes with water in the main groundwater system (depths < 750 feet) during discharge.

Paul Christensen, Hydrologist
NPS Washington Office Water Resources Division

The isotopic signatures and geochemistry of the groundwater in Montezuma Well appear to be consistent with waters that have evolved from recharge at the Mogollon Rim, are influenced by rock/water interaction along the flowpath, and mix with a small portion of deep brines. The groundwater in Montezuma Well is quite different from the shallow groundwaters in the immediate area (source < 300 feet) indicating that the Well is probably protected from the extensive shallow groundwater resource development in the area. However, any future use of groundwater from the deeper Redwall Limestone aquifer upgradient from Montezuma Well could influence the groundwater supplying the Well.

2.5 MRWMC GROUND-WATER DEMAND

p. 10, 4th paragraph. Please add to the text a table showing the values used for parameters in THWELLS and where these values were found.

Kathy Davis, Superintendent, Montezuma Castle
Comments for EID

1. The NEPA process used: This is being used differently from my experience with NEPA. All alternatives considered should be compared with environmental and social criteria. The EA should go out for public review before the FONSI is sent out.
2. Number of customers served: Number is currently 206 mostly domestic households, but with 462 lots available number that can potentially be 668. See Subsection 2.5 MRWC Groundwater Demand (page 9-11) discussion to determine whether impact is accurately described with potential customers. What pumping rate used? Other than domestic households? MRWC could get more customers beyond 668 or another company may buy MRWC and pump more. See references to customer numbers on pages...Page 2 para 2; page 9 to 11.
3. Regional upper and lower aquifer: 2.1 Regional Aquifer discussion states "an upper and lower unit of the regional aquifer exists beneath the MRWC. (Page 6, para 1)" One of our concerns is that the upper aquifer would not meet long time water demands so Well #4 would be drilled deeper into the Red Wall, which may be connected to Montezuma Well. Also a production well in the upper aquifer will continue local drawdown and thus affect Beaver Creek. The next sub section 2.2 Regional Decline in Ground Water Levels states downward trends in ground water. (Page 7, para 2).
4. Comparison of water level elevations: Page 8, para 4. Understand comments about Beaver Creek elevation compared to AFI. What is "near" AFI project?
5. Arizona Water Company well: Page 9, para 3 has discussion of AWC wells, including one that is closer to Montezuma Well. Is this the one on hill? See Figure 5.
6. Alternatives: Discuss 3.0 Alternatives to the Proposed Project (Pages 12-18). All alternatives considered should be described and compared, not just the two that are being dismissed. Other alternatives could include 1) drill MRWC existing wells deeper and 2) that another water company serves the customers and does not use Well #4. For 3.1.2 POU-RO there is discussion about RO process producing waste water and triple the amount of water pumped? Is this true for RO?
7. Environmental consequences: 4.0 Environmental Consequences of the AFI is an inadequate assessment since it looks at the AFI facility and not the cumulative and indirect effects. In 4.1 Ground Water the statement that AFI will not increase use of ground water is untrue since getting AFI facility to treat arsenic will allow more water to be pumped for more customers. We question the projected 100-year drop of 2 feet from pumping. (Page 19, para 1 to 3). In 4.4 Land Use – Formally Classified Lands the Coconino National Forest, US Forest Service is missing from the list (Page 21, para 1). In 4.6 Wetlands the statement that AFI will have no direct effect on wetlands....there is strong potential for cumulative effects due to ground water drawdown on Beaver Creek, etc. (Page 21, para 2 to 4). In 4.8 Sensitive Biological Resources should the National Park Service data base be referenced? The Environmental Review Tool was queried for potential "indirect" effects of the AFI project. What were the indirect effects? (Page 24 to 25). In 4.9 Surface Water the EID does not make the connection between surface, creek flow, and groundwater drawdown.
8. NPS Environmental Screening Form: Let's compare the NPS listed resource effects to consider with those in the EID.
9. Reference citations missing: 1) Page 8, para 4, line 11...(1997); 2) Page 10, para 5, line 4...(van der Heijde 1996), 3) Page 22, para 3, line 4...Claycomb-Rockwell Associates study in 1999

Sharon Kim, Chief of Natural Resources at Montezuma Castle
Comments for EID

Several issues here related to the commercial well use:

- 1) Effect to the Montezuma Well proper
- 2) Effect to Montezuma Well residence wells
- 3) Effect to the Wet Beaver Creek riparian corridor

Pg. 8, 1st paragraph under Section 2.3—"The 2.55 ft of annual decline in the regional water table has not occurred in Montezuma Well National Monument (Montezuma Well)"—not a true statement—our residence well within Montezuma Well National Monument has shown an annual rate of decline of 2.25 feet per year, with a range of 1.8 and 3.4 feet per year over 10 year averaging periods.

Pg. 8, 1st paragraph under Section 2.3—"NPS, 2007" citation is off a general information PUBLIC WEBSITE (see attached next page), but cited as though it is scientific data. See Reference section (pg. 35).

Pg. 8, 2nd paragraph under Section 2.3—Is this paragraph drawing inference from the website's general information referred to in the previous comment?

Pg. 8, 3rd paragraph under Section 2.3—USGS 2007 does not have a citation in the Reference section (pg. 35). Possibly Konieczki and Leake that I referred to??

Pg. 27, Section 4.11—An employee who lives directly next to an AFI for a different water company in Rimrock indicated that there is a high level of noise associated with operations. In particular, he stated that there is extensive traffic noise that occurs intermittently at various hours across a 24-hour period (day and night). If this type of noise from the other AFI plant is similar to the AFI plant proposed here, it is likely that this will affect wildlife movement in the area, especially if the noise is sporadic and unpredictable in nature. Montezuma Well National Monument provides excellent habitat for wildlife, including mountain lions, deer, foxes, and coyotes, and this type of noise could disrupt their activity patterns. Furthermore, depending on the intensity of the noise level, this could also impact visitor enjoyment at Montezuma Well National Monument, especially in the Pasture area.

REFERENCES:

Konieczki and Leake, 1997. Hydrogeology and Water Chemistry of Montezuma Well in Montezuma Castle National Monument and Surrounding Area, Arizona. U.S. Geological Survey: Water-Resources Investigations Report 97-4156.

National Park Service
U.S. Department of the Interior



Montezuma Castle National Monument Exploring Montezuma Well



NPS

Cliff dwellings are perched along the rim of Montezuma Well.

Take your time as you explore the trails at Montezuma Well and discover the tranquility of a site still considered sacred by many local tribes. The shaded forest along the trail near the swallet ruin and the outlet provides welcome relief from the unrelenting Arizona sunshine. The temperature difference at the outlet can be up to 20 degrees cooler than along the rim of the Well, making it easy to imagine the people of the Sinagua culture spending the hot summer days in this tranquil setting.

The constant supply of warm, 74 degree water was the life-blood of the people who made their home here. Over 1.5 million gallons of water flows into the Well every day, a rate that has not fluctuated measurably despite recent droughts throughout the state of Arizona. This water enters a "swallet" near the end of the trail into the Well and flows through over 150 feet of limestone before re-emerging from the outlet into an irrigation ditch on the other side. Sections of this ditch date back over 1,000 years. The value of this

The legacy of the Sinagua culture surrounds you during a visit to Montezuma Well. From cliff dwellings perched along the rim to large pueblo ruins and an ancient pit house, the variety of these archeological sites is a testament to the ingenuity of these people.



NPS

From an analysis of the EID by John Ward, R.G. (Independent Groundwater Consultant Contracted by NPS)

Comments on Regional Conditions

The report describes the regional aquifer as consisting of the Verde Formation, underlying basalts, and the Paleozoic Supai Formation and Redwall Limestone. The report states that the basalts form a confining unit between the overlying Verde Formation and underlying Paleozoic rocks, and that water supply wells in the area have not penetrated those Paleozoic rocks. Furthermore (in the Tiemann Well aquifer test description), it is stated that the thickness of the Verde Formation is 1,800 feet.

The presumed source of water to Montezuma Well (and Soda Spring) is from the Paleozoic rocks, so the report concludes that water supply wells are not obtaining their water from the same aquifer that is supplying water to these features. The observation that groundwater levels in the Verde Formation aquifer have declined an average of 2-3 feet per year, while the discharge from Montezuma Well has not declined, is evidence used to support the contention that the Verde Formation aquifer and the lower Paleozoic Aquifer are hydrologically separate.

Similarly, the report contends that since the difference between the water table elevation in the Verde Formation and the stream surface elevation in Wet Beaver Creek is more than 100 feet, any additional induced leakage from the creek to the aquifer due to pumping would be very small.

This description is based primarily on early work in the area, and is broadly correct, although in this area the hydrogeologic conditions need to be looked at more closely:

- The Verde Formation is much thinner in this area, and is probably dry beneath much or all of the Well Unit. Therefore, the aquifer in the Verde Formation is bounded to the east and north. Indicative of the bounded nature of the aquifer are the records showing water level declines of up to 5 feet per year. (The report concludes that water levels have declined 2-1/2 feet per year, but they did not include records from two wells: A-15-5-36 DAB, and A-15-6-31 CBA2 [the new residence well] which show these greater rates of water level declines.)
- The Tiemann well aquifer test results indicated a much higher transmissivity, and the well had a much higher specific capacity (pumping rate divided by drawdown) than other wells in the area (for comparison, test results on the new residence well indicated a transmissivity less than one-hundredth of the Tiemann well). Although the Tiemann well aquifer test results showed high aquifer productivity, long term performance of this well will probably be impacted by these aquifer boundaries and areas of much lower transmissivity, which will result in much greater than predicted drawdowns in the well, lower well yields, or both.
- The simulation of 100-year drawdown extent from Tiemann Well pumping is based on the Tiemann Well aquifer test results, and did not include effects of aquifer boundaries or other test results, nor were the effects of the significant regional water level declines (more than 100 feet in some wells) accounted for. These effects would distort the cone of depression around the pumping well making drawdown greater in some areas, and probably less in other areas, than indicated by the simple analysis presented in the report.
- The conclusion that Montezuma Well will not be impacted by this pumping is based on the assumption that no pumping will occur from the rock units that are the source of water to Montezuma Well. Although current pumping has induced nearly 100 feet of water level declines at the new residence well, it is true that no significant change in discharge from Montezuma Well has been noted. However, two facts need to be considered: 1) water level declines are continuing, and even

From an analysis of the EID by John Ward, R.G. (Independent Groundwater Consultant Contracted by NPS)

accelerating, 2) water supply wells do tap into the Paleozoic rocks. These conditions will continue into the future, strongly indicating that discharge at Montezuma Well will eventually be adversely impacted by groundwater pumping.

- Wet Beaver Creek gains water from groundwater discharge upstream of Montezuma Well. The creek loses water to the groundwater system downstream of the Well. This is a natural occurrence, although the current and past regional groundwater declines have likely induced greater rates of losses from the Creek. The difference between the stream level and groundwater level at the Tiemann Well may be much less than 100 feet in the vicinity of Beaver Creek. If this is true, then the hydrologic connection may be greater than indicated in the report.

General Comments

The [EID] report should be updated using newer published information by the USGS, which includes the regional geophysics and the new groundwater geochemistry. Geologic maps of the area show truncation of the Verde Formation near the northeastern edge of Montezuma Well, which provides indication of aquifer boundaries, at least in this area. These should be reviewed and used to revise the discussion of the lateral extent of the aquifer in the Verde Formation.

The Tiemann Well aquifer test results should be critically evaluated in context with other test results, and with the significant declines in water levels from existing pumping. Cumulative effects from all pumping should be considered.

Several wells in the area tap the Paleozoic rocks (eg., the new residence well, the ADOT well near the I-17 rest stop, possibly even the Tiemann well). Available well logs should be reviewed and those wells should be identified. The amount of groundwater pumping from the deeper Paleozoic rocks should be tabulated. A map of regional cumulative groundwater level declines should be prepared. This should be compared to groundwater pumping.

The report should include a discussion of the gaining and losing reaches of Wet Beaver Creek. The Arizona Game and Fish letter regarding additional stream losses that could occur from pumping is a legitimate concern. The head differences between the stream and the groundwater in the vicinity of the stream should be mapped, and those areas hydrologically connected to the groundwater system should be identified. Both cumulative and individual effects of pumping on stream capture should be calculated.

The National Park Service's level of concern for this project is justified. The projected pumping from a well this close to the Park boundary may cause additional increases in water level declines in the new residence well, and eventually, adversely impact discharge from Montezuma Well.